composition of vegetable matter. It is to be found in the ashes of all timber and plants in association with lime and soda; but, in this case we find the potash, or more correctly speaking, the oxide of the metal potassium, is in chemical combination with oxalic acid; thus forming a compound salt, highly crystallized. The paradoxical feature of the phenomenon is presented by the query—Where did the oxalic acid come from to combine with the oxide of potassium? Analysis has failed to detect oxalic acid in the wood or leaves of the *Fagus*. There are certain well-known plants which furnish oxalic acid. Notably, the *Oxalis acetocella*, from which it used to be extracted before the great advances of chemistry enabled man to be independent of that plant as its source. Combined with lime it has been found in some lichens, while the roots of rhubarb and bistort contain it in small quantity in combination with potash; but this is the first instance, it seems, of this organic combination being found in a solid, compact, crystallized form, especially in the heart of a tree."

THE fiery sunsets which revealed the existence of the Krakatão dust in the atmosphere were also noticed by Prjevalsky in November and December 1883, as he was crossing the Gobi and the Northern Ala-shan. He describes them as follows in his "Fourth Journey to Central Asia":—"After a bright day, which is here the usual state of the weather during the winter, light cirrus and cirro-stratus clouds appeared in the west, just before sunset, or immediately after. Probably they were floating all day long in the upper strata of the atmosphere, but became visible when the sun went beneath the horizon. Immediately after that, the whole of the western part of the sky became lighted by a bright cream light, which soon acquired a violet colour in the upper parts, with stripes of shadows. At the same time the shadows of the night rose in the east, dark lilac in the lower parts, and violet in the upper parts. The violet colour vanished by and by in the west, and a segment of bright orange colour appeared close by the horizon, on a cream background. Sometimes it acquired a light red colour, but sometimes it became bright red or even blood-red. In the meantime the lilac colour disappeared in the east, and all the sky became of a gray-lilac colour. Amidst the changing colours in the west, Venus glowed like a diamond descending beneath the horizon at the time when the twilight, which lasted for about one hour and a half, came to an end. During nearly all that time the glow in the west was casting shadows, and all objects in the desert appeared in a fantastic light. The sunrise was accompanied by the same phenomena, but in a reverse order: sometimes the morning twilight began with the appearance of a blood-red colour. At full moon the phenomena were less striking, and in the atmosphere of Northern Ala-shan, which is charged with dust, we saw them less often than in the Central and Northern Gobi."

A HUGE Greenland whale, 90 feet in length, after having been seen in various parts of the Cattegat, lately went ashore in the Sound, and was killed. During the previous twenty years a whale had not been seen in these waters. The skeleton is to be forwarded to the Copenhagen Museum.

PROF. O. TORELL AND DR. TRYBOM have petitioned the Swedish Government for funds sufficient to enable them to continue their researches on the sea fisheries of Sweden, and to establish a biological station on the west coast.

LAST summer Dr. Th. Thoroddsen effected some further explorations in the interior of Iceland, visiting parts hitherto untraversed. It is said that in Norse times, in the district west of Hecla, by the River Thjorsaa, a numerous population inhabited a fertile valley, which was laid waste in 1343 by a terrible volcanic eruption of the Raudukambar Mountain. Dr. Thoroddsen now reports that this mountain is not a volcano at all, and that in historical times no volcanic eruption has devastated this valley; but he is of opinion that the colony in question was destroyed through an eruption of Hecla in the middle of the fourteenth century. Dr. Thoroddsen afterwards explored the desert land south of the Hofsjökul, particularly a mountain range, called Kjerlingarfjöll, close to the south of it. These mountains had never been explored before, and Dr. Thoroddsen found a country which he describes as very remarkable. It was known in the low lands that there were some valleys with hot springs, steam having been seen from a distance, but the springs had never been visited. Dr. Thoroddsen found grand sulphur springs in great numbers, which, he states, far excel the well-known ones at Myvain and Krisuvik. There are also numbers of large boiling mud pools—blue, red, yellow, and green in colour—whilst steam penetrates everywhere through fissures in the earth with terrific noise. One steam jet, 6 to 9 feet in height, kept up such a continual roar that it was impossible to hear the loudest shouts for a long distance. Several subterranean cavities were also found containing boiling clay pools, and around one of them the earth trembled far and wide, whilst far down below in the earth a noise was heard like that which might proceed from a gigantic butter-churn. The valleys in which these springs and mud pools are found are surrounded by extensive and deep snow-fields with innumerable fissures, through which the roar of the steam far below the snow can be heard in some places, whilst in others the steam escapes through them. The ground in these valleys is so hot that only with the greatest care is it possible to tread on the thin crust of clay covering the boiling mud below.

THE additions to the Zoological Society's Gardens during the past week include a Ring-tailed Coati (*Nasua rufa* ♀) from Brazil, presented by Mr. N. T. Williams; three Herring Gulls (*Larus argentatus*), British, presented by Mr. L. V. Harcourt; six Moorish Geckos (*Tarentola mauritanica*) from the south of France, presented by Masters F. and O. Warburg; a Thigh-striped Wallaby (*Halmaturus thetidis* ♀) from New South Wales, deposited; a White-throated Capuchin (*Cebus hypoleucus*), a —— Capuchin (*Cebus* sp. inc.) from Central America, purchased; an Eland (*Oreas canna* ♀), a Yellow-footed Rock Kangaroo (*Petrogale xanthopus* ♂), born in the Gardens.

OUR ASTRONOMICAL COLUMN.

THE MULTIPLE STAR ζ CANCRI.—This remarkable stellar system has justly attracted much attention ever since Sir W. Herschel discovered in 1781 that it was really composed of three, not two stars, the principal star being itself a close double. But the interest with which the system was regarded was greatly increased by the remarkable paper which Prof. O. Struve produced upon the subject, and communicated to the Paris Academy of Sciences in 1874 (*Comptes rendus*, vol. lxxix. p. 1463), and in which he pointed out a noteworthy inequality in the motion of the distant companion C, having a period of about twenty years. The question was again taken up by Prof. Hugo Seeliger in 1881, in a paper entitled "Ueber die Bewegungverhältnisse in dem dreifachen Sternsystem ζ Cancri," and presented to the Vienna Academy of Sciences on May 5 of that year. Prof. Seeliger has continued his discussion of the observations of the star, and has recently published a further paper on the subject, which appears in the Memoirs of the Royal Bavarian Academy of Sciences, Munich, under the title "Fortgesetzte Untersuchungun ueber das mehrfache Sternsystem ζ Cancri." The result of his further labours has been in effect to confirm the results he had obtained in his earlier work, and those which Prof. Struve had brought out in 1874.

The three stars A, B, and C, have the magnitudes respectively 5·0, 5·7, and 5·3. The proper motion of the system amounts in a century to + 10″·6 in R. A., and to − 11″ in Decl. The close pair, A and B, first separated by Herschel, have a motion round one another in about sixty years, their apparent distance from each other varying from about 0″·6 to 1″·1; whilst C, the more distant companion, has moved through about 55° of position-angle round the other two since Herschel's

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observation in 1781, its distance never very greatly varying from $5\frac{1}{2}''$. The motion of A and B round their common centre of gravity does not appear to be disturbed to any appreciable extent by the influence of C, which is so placed as not to affect their apparent relative motions, even though a very considerable mass be assigned to it, and as a fact Prof. Seeliger finds, for the most probable value of the mass of C, $\frac{m'}{1 + m} = 2{\cdot}386$, where 1, m, and m' are the masses of A, B, and C respectively. But there is a periodical retrogression of C itself which is most easily accounted for by supposing the presence of a close companion, one hitherto undetected, and therefore either entirely dark, or but faintly luminous. The distance of this companion is probably only a few tenths of a second, the distance of C from the point, S_2, round which it appears to revolve, and which may be reasonably assumed to be the centre of gravity of itself and of D, the as yet undiscovered fourth member of the family, being only about one-fifth of a second.

The entire group therefore may be considered as a double-double, the following being the definitive elements derived for the two pairs:—

	For A and B.		For C about S_2.
T ...	1868·112		... ... 1860·127
☊ ...	109°·735	1850·0	... ... 71°·958
λ ...	80·190		... ... 109·677
i ...	11·135		... ... 17·352
e ...			... ... 0·1106
a ...	0″·853		... ... 0″·217
φ ...	22·450		... ...
n ...	− 6·0898		.. ... − 20·460

For the motion of S_2 round the optical centre of A and B:—

$$\rho_0 = 5''{\cdot}438.$$
$$p_0 = 145^\circ{\cdot}46 - 0^\circ{\cdot}513\,(t - 1850{\cdot}2).$$

The concluding portion of this valuable contribution to the study of a most interesting case in stellar physics is devoted to the consideration of personal errors in the observations, and a plate is added giving a graphical representation of the apparent motion of C, and bringing out in a striking manner the evidence the observations afford of the looping of the curve.

ASTRONOMICAL PHENOMENA FOR THE WEEK 1889 FEBRUARY 24—MARCH 2.

(For the reckoning of time the civil day, commencing at Greenwich mean midnight, counting the hours on to 24, is here employed.)

At Greenwich on February 24

Sun rises, 6h. 57m.; souths, 12h. 13m. 21·5s.; sets, 17h. 30m.: right asc. on meridian, 22h. 31·6m.; decl. 9° 16′ S. Sidereal Time at Sunset, 3h. 49m.

Moon (New on March 1, 22h.) rises, 2h. 59m.; souths, 7h. 13m.; sets, 11h. 23m.: right asc. on meridian, 17h. 30·3m.; decl. 20° 54′ S.

Planet.	Rises.	Souths.	Sets.	Right asc. and declination on meridian.	
	h. m.	h. m.	h. m.	h. m.	° ′
Mercury..	6 5 ...	11 2 ...	15 59 ...	21 19·9 ...	12 49 S.
Venus ...	8 2 ...	15 2 ...	22 2 ...	1 20·3 ...	11 1 N.
Mars ...	7 49 ...	14 2 ...	20 15 ...	0 21·1 ...	1 46 N.
Jupiter ...	4 1 ...	7 56 ...	11 51 ...	18 13·8 ...	23 5 S.
Saturn ...	15 17 ...	22 53 ...	6 29*...	9 12·8 ...	17 21 N.
Uranus ...	21 40*...	3 4 ...	8 28 ...	13 20·8 ...	7 49 S.
Neptune..	9 49 ...	17 32 ...	1 15*...	3 51·1 ...	18 27 N.

* Indicates that the rising is that of the preceding evening and the setting that of the following morning.

Feb.	h.	
25 ...	1 ...	Jupiter in conjunction with and 1° 11′ south of the Moon.
27 ...	5 ...	Mercury stationary.
28 ...	2 ...	Mercury in conjunction with and 4° 18′ north of the Moon.

Meteor-Showers.

	R.A.	Decl.	
	°	°	
Near β Trianguli	30 ...	35 N.	
,, δ Virginis	192 ...	2 N.	
,, α Serpentis	235 ...	10 N. ...	Swift; streaks.
	280 ...	17 S. ...	Very swift.

Variable Stars.

Star.	R.A.	Decl.		h. m.	
	h. m.	° ′			
U Cephei	0 52·5 ...	81 17 N. ...	Feb. 27,	18 28	*m*
T Arietis	2 42·1 ...	17 3 N. ...	,, 27,		*M*
Algol	3 1·0 ...	40 32 N. ...	,, 28,	5 52	*m*
R Geminorum ...	7 0·7 ...	22 53 N. ...	,, 26,		*m*
R Canis Majoris ...	7 14·5 ...	16 11 N. ...	,, 25,	1 30	*m*
			and at intervals of	27 16	
T Geminorum ...	7 42·6 ...	24 1 N. ...	Mar. 1,		*M*
U Virginis	12 45·5 ...	6 10 N. ...	,, 2,		*M*
U Coronæ	15 13·7 ...	32 3 N. ...	Feb. 25,	5 8	*m*
X Cygni	20 39·0 ...	35 11 N. ...	,, 28,	2 0	*m*
T Vulpeculæ ...	20 46·8 ...	27 50 N. ...	Mar. 2,	0 0	*m*
Y Cygni	20 47·6 ...	34 14 N. ...	Feb. 24,	17 40	*m*
			,, 27,	17 40	*m*
δ Cephei	22 25·0 ...	57 51 N. ...	,, 28,	3 0	*m*

M signifies maximum; *m* minimum.

GEOGRAPHICAL NOTES.

An Antarctic Expedition is being again talked of. A New Zealand colonist (of Norwegian origin) has come to Europe for the purpose of taking out a contingent of his countrymen accustomed to fishing. His object is to endeavour to organize an Antarctic whale fishery. He hopes to equip two steamers with which to explore the region generally, and, if possible, he will leave a contingent of men on Victoria Land, or some other suitable point, for a whole year. One or more scientific men will be taken, so that if the proposed expedition be carried out we may expect some important results.

Dr. Hugo Zöller (sent out by the *Kölnische Zeitung*) has been doing some original exploring work in German New Guinea. He made an excursion for a considerable distance into the interior. In November last he ascended the Finisterre Mountains to a height of 9000 feet. Some of the peaks in this and the Bismarck Ranges rise to a height of over 10,000 feet.

Captain Page, who recently read a paper on the Gran Chaco at the Royal Geographical Society, proceeds shortly to the Argentine Republic for the purpose of thoroughly exploring the Pilcomayo. He will probably be accompanied by a naturalist.

The French are endeavouring to raise the funds for a Congo railway which will pass entirely through French territory, in opposition to the scheme for a railway from Vivi to Stanley Pool, for which a survey has recently been made by Belgian engineers. The French railway would run from Brazzaville, on the north side of Stanley Pool, to the River Kwilu, 100 kilometres. Steps, it is stated, will be taken to render the Kwilu navigable, and so establish direct communication between the Congo and the Atlantic.

In a long article in the new number of the *Mouvement Géographique*, the question of the origin and course of the Lomami, one of the great southern tributaries of the Congo, is discussed. The conclusion is that it is the same river which Cameron crossed far to the south, and which has been crossed at various points further northwards. It enters the Congo some distance below Stanley Falls. Its course is probably about 1000 miles in length.

Dr. Oscar Baumann contributes to the February number of *Petermann's Metteilungen* a short monograph (with map) on the district of Usambara, in East Africa. The monograph ought to be specially interesting to geologists.

The February number of the *Scottish Geographical Magazine* contains several very useful articles. Colonel Cadell, Chief Commissioner of the Andaman Islands, gives a highly interesting account of the group, and especially of its people, who, he maintains, have been very much maligned from the days of Marco Polo downwards. The people are fast dying out. Dr. Guppy sends a preliminary note on the geological structure of the Sindang-Barang district on the south coast of Java. Dr. Guppy sums up the structure of the sea-coast of this part of Java as follows: a basis of massive volcanic rocks overlain by submarine tuffs and volcanic muds as far as twelve miles from the coast, and by older and allied tuffs farther inland. The upheaval in post-Tertiary times has been very great, and can only be measured by several thousands of feet. Mr. S. P. Ford gives a brief *résumé* of our knowledge of the geography of the Transvaal; and Mr. W. A. Taylor supplies a real want in his account of the Philppine Islands, compiled from various recent sources.

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